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ABSTRACT

This booklet provides a sampling of strategies that will help students with content literacy. It is based on the idea that reading is about understanding such that the words are transformed into meaningful thoughts within the reader's cognitive frame of reference. The booklet contains various learning theories, and the strategies suggested correlate to these theories. The strategies are divided into three categories: preparation, during reading, and after reading, which correspond with 9 comprehension strategies, 22 organizational strategies, and 6 retention strategies. The booklet concludes that incorporating strategies into instruction will help increase comprehension levels and move students from passive to active learners. (Contains 37 references and 5 appendixes with extensive worksheet examples for the given strategies.) (EF)

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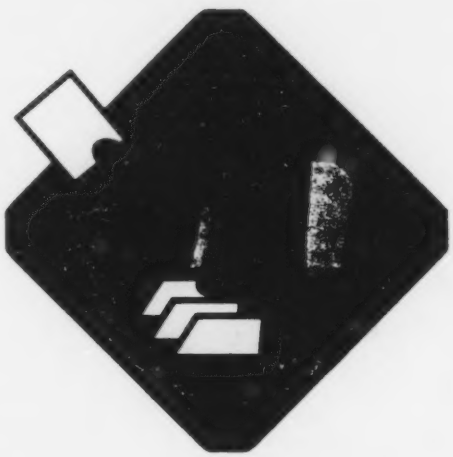
Effective Content Reading Comprehension and Retention Strategies



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Introduction

The purpose of this booklet is to provide a sampling of strategies that will help students with content literacy. I will begin by defining the word strategies. Strategies are defined as any mental operations that the individual uses, either consciously or unconsciously, to help him or her learn. When content reading strategies are taught students become active independent learners. It is crucial that we move students from passive recipients of information to active participant in their own learning. Equipping students with the tools (strategies) that will motivate them to be involved in learning can do this.

This booklet contains various theories of how we learn. This information is critical when planning instruction. You will find that the strategies I have listed are those that are aligned with the theories discussed. It is my firm belief that before we can expect students to learn, we must teach them how to learn.

Reading is not how well you pronounce words as you glide across the page, but rather, how your eyes of understanding are open to the extent that the words are transformed into meaningful thoughts within your cognitive frame of reference; thereby completing the comprehension process.

Reading skills are the same in each discipline. Reading requires that students make meaning from what they read in text. Regardless of which subject the reading is done in, it will include comprehension, vocabulary, critical reading, textbook skills, library tools, following directions, and study skills (Abbott ,1999). Therefore, if comprehension increases in content areas it will increase overall.

The key to success with these strategies will come only with an extra commitment to take the time necessary for students to learn the strategies. It will require constant rehearsal. I have used most of these strategies within my classroom. They have been successful. However, the results were not always immediate.

The strategies are divided into three categories, preparation, during reading, and after reading. It is important that care is given to preparing students to learn. Once the preparation is completed, during reading strategies will help students to facilitate their own learning. The after reading strategies are designed to foster retention as well as help students organize information into their schemata.

Incorporating strategies into instruction will help increase comprehension levels. It will move students from passive learners to active learners. That is the goal of education.

The Comprehension Process

Comprehension is defined as a constructive, interactive process involving three factors —the reader, the text, and the context in which the text is read. Comprehension results from an interaction among the reader, the strategies the reader employs, the material being read, and the context in

which the reading takes place. Comprehension is one of the most complex internal processes in human learning (Swaby, 1989). Without comprehension, reading is meaningless.

There are several theories of how text is comprehended. These theories offer different views on how readers construct meaning from words on a page. These theories will be discussed because of the instructional implications of each view. The success of the reader is contingent upon the use of instructional strategies that address these theories. A basic sensitivity to the ways children comprehends is essential to all instruction (Swaby ,1989). We will look at some strategies that teachers can use to improve comprehension in their students and thus reduce the failure rate within the classroom.

In the traditional view comprehension is a major skill comprised of four main types of comprehension subskills. These subskills are literal comprehension, inferential comprehension, evaluative comprehension, and critical comprehension skills. An understanding of these skills will allow the teacher to plan strategies that will enable students to comprehend at each subskill level.

- *Literal comprehension* refers to recalling facts, details, and sequence, and knowing word meanings. It is the accessing of information stated in oral or written communication.
- *Inferential* comprehension uses a combination of literal and prior knowledge to make inferences beyond what has been stated. These skills involves comparing and contrasting, identifying causes and effects, explaining, and making predictions, also inferring central ideas.
- *Evaluative* comprehension calls for the forming of personal opinions based on communicated information. Students are asked to make judgements, make and justify choices, take stands on issues, and defend or reject actions.
- *Critical* comprehension is the ability to analyze material in terms, of form, styles and content. At this level students are asked to distinguish fact from opinion; recognize logic or consistency of thought; distinguish among literary forms; and recognize mood, intention, or point of view.

The psycholinguistic approach regards comprehension as a bridge between the known and the unknown. Incoming information is comprehended by relating it to information already stored in your knowledge bank. Concepts about incoming information should be pre-established in the cognitive structure. The student must have a conceptual knowledge – which he/she can relate to new information before comprehension takes place.

The psycholinguistic view delineates two major functions of comprehension – forming concepts and interrelating concepts. The more a student knows about a subject, the more they are able to know about it. Comprehension depends

largely on prior knowledge (Swaby1989).

The second major function of the comprehension system is to interrelate the concepts. Students need to know how new information relates to concept pre-established in their cognitive framework. A student experiences concept readiness at this juncture of the comprehension process.

The cognitive framework is a network of connections between meaningful and valuable information. These connections help student to categorize and use past experiences to understand present experiences. The interrelatedness of concepts allows the student to develop elaborate, enrich, expand, and complement new information (Swaby ,1989).

According to the psycholinguistic view, a lack of comprehension may stem from inexperience with the concept material, from an inability to categorize the information appropriately, or from difficulty in connecting new material to relevant, meaningful, and familiar information (Swaby, 1989).

Schema Theory

Schema theory explains how information is stored in memory, retrieved from memory, and used in comprehension. This theory assumes that everything a person learns is organized and stored hierarchically into units known as schemata. A schema consists of existing information relevant to a given concept. It is the organized knowledge that one has about people, places, things and events (Gunning, 1996). This information is organized as concept systems. The learner stores a set of related concepts in his/her memory in such a way that the relations between concepts, as well as the concepts themselves are remembered and can be recalled (Gunning 1996).

Mental Models

Comprehension can be thought of as the construction of mental models. Activating schemata is part of a mental model. This theory views comprehension as a process "of building and maintaining a model of situations and events described in text" Two kinds of mental models are working and passage. A working model constructs present events, and a passage mental model constructs an awareness of the whole by building links between events. These are often cause/effect connections. Constructing links is important, as the events read are most readily remembered when connections have been constructed (Gunning 1996).

Propositional Theory

A propositional model of comprehension emphasizes the structure of text in terms of a series of propositions. A proposition is a statement of information. As students read, text is transformed into propositions. Propositions are combined, deleted and integrated so that a macrostructure is formed. The macrostructure is a running summary of the text. The propositions are organized according to their relative importance in a hierarchy. Propositions toward the top of the hierarchy are generally better remembered than those on the bottom. Students are able to detect main ideas and supporting details

will better understand and retain information in the text rather than a reader who fails to use the text's organization (Gunning, 1996).

Readers can encode information as a mental model, or as a set of propositions. Propositional encoding is preferred when retaining the structure of the text is important or when dealing with abstract information. Mental model encoding works better with concrete information that is not in the reader's schemata (Gunning, 1996).

In the propositional theory, readers construct a main idea or macrostructure as they process text. Comprehension, organization, and retrieval of information from the text are based on the formation of this macrostructure. A key factor in aiding the propositional theory is prior knowledge. When students have enhanced background knowledge of the text, comprehension will increase significantly (Gunning, 1996).

Comprehension Strategies

Comprehension strategies are useful in helping students in the preparing, organizing, elaborating, rehearsing, and monitoring of text as it is being read. Student should be taught how to use comprehension strategies and typographical signals to understand the author's intended message. Teaching strategies will not only help students develop comprehension, but develop other attributes as skillful readers. When teaching content, strategies must be integrated to help student in the development, elaboration, enrichment, and expansion of new ideas to old. The context of the content will determine which strategy to integrate. There are also affective strategies that motivate and help create interest in the construction of meaning. These strategies are effective when coupled with the various theories of how text is comprehended.

There are several instructional principles that teachers should use when teaching content area subjects. The first principle of content area reading instruction is to help students construct meaning from text. The second principle is to have students focus on the big idea. A third principle is to include instruction in how to use organizational patterns to aid reading comprehension and writing. A fourth principle is to activate prior knowledge. The fifth principle is to help students develop vocabulary concepts. A sixth principle is to stress instruction in the application of learning (Gunning 1996).

Content literacy is the ability to use reading and writing for the acquisition of new content in a given discipline (Abbott 1999). In order for students to become successful in content area subjects they must be exposed to a variety of reading and learning strategies that will help them understand new concept. Content literacy strategies help students move from the passive acquisition of facts to the active application of ideas to problems (Abbott 1999).

According to Abbott (1999), three principles provide a framework for using content literacy instructional strategies:

- Learning occurs most rapidly and efficiently when new concepts and information

build on what is already known.

- The easiest way to gain and hold students' interest and attention is by engaging them in intellectually rich activities that require problem solving, language interactions, and active participation.
- Personal investment in an activity increases and sustains learner persistence and productivity.

There are strategies that can be used to remediate inadequate comprehension. The following list identifies six strategies for remediating inadequate comprehension (Swaby 1989):

- Activate student's prior knowledge.
- Assist children in print structure.
- Develop critical thinking through questioning.
- Train metacognitive skills.
- Train fluency
- Encourage visualization

When we look at the schema and mental models concept of how we learn, both stress the importance of the reader's background. Students must have a balance of strategy instruction with background building to prepare for concept readiness. The idea of concept readiness refers to the student's ability to incorporate new information with their current schema.

It is critically important for the success of a lesson to build a solid background for the student before introducing new information. It is the retrieval of the background knowledge that the student has that helps the student to integrate the new knowledge. This connection is what leads to comprehension.

ActivatingPriorKnowledge
Anticipation/Reaction Guides
(Grades 3-12)

Activating prior knowledge is defined as helping students build bridges between what they already know about a topic and the new information they are reading about the same topic.

Brainstorming, Talk Through – aids in surfacing what students know – provides the teacher with an idea of the kind of pre-teaching that must take place.

PREP – this strategy allows the teacher to introduce a topic by focusing on what students know and aids students in making relationships between what they know and are learning. It is done in a group setting –discussion style.

The teacher introduces topic and records students' responses to the following statement/questions:

"Tell me all you know about_____."
"How did you learn that_____?
"What more do you still want /need to learn?"

These strategies are used to assess a class's prior knowledge and have students reflect on it. Also, it can be used to build interest. Ask questions to generate a debatable statement about a

topic. This will often spur the interest of the students (Gunning 1996).

The anticipation guide can be used with any subjects. It works best when students have some familiarity with the subject. The anticipation guide should help students refine erroneous concepts, since it involves confronting misconceptions (Anticipation/Reaction Guide, online).

(See appendix A1)

Survey Technique
(Grades 4-12)

This technique orients the reader to the material to be read and sets up the purposes for reading. The advantage of the survey is that it requires a small amount of time to accomplish the task. The survey technique has six steps: analysis of the chapter title; analysis of subheads; analysis of graphics; discussion of introductory paragraph; discussion of summary; construction of main idea (Gunning 1996).

Structured Overview
(Grades 3-12)

A technique designed to help students relate new words and concept to known ones. The overview provides a structure that will allow students to see the interrelationship between the old and the new concepts. Useful additions to the structured overview are graphic organizers. The organizers can be used as a tool with structured overviews. It gives a visual representation to the relationship that the concepts or words have in common. These organizers are visual devices designed to help readers note relationships between key concepts or events in a selection.

Advance Organizers
(Grades 3-12)

An advance organizer organizes students' thinking so that they now what information they already have will help them in comprehending new information. It is a strategy used to activate and engage a student's prior knowledge. This organization takes place before the student reads the content information.

This strategy is important when using the propositional theory of how students learn. Organizers alert students to the prerequisite concepts they will need for comprehension. In addition, it is an attempt on the teacher's part to try to make the student concept ready. A readiness to link new concepts with students' existing concepts. There are three steps involved in constructing advance organizers (Swaby 1989):

- Identify the main ideas or concepts of the selection to be read.
- Establish parallels between the concepts and the children's prior experiences.
- Tell children how their prior experience directly relates to the selection they are going to read.

K-W-L-H (What you know, want to know, learned, and how you can learn more)
(Grades 3-12)

This is a technique to be used before, during, and after reading. The before – reading stage consist of four steps: brainstorming, categorizing, anticipating or predicting, and questioning. Brainstorming actives prior knowledge so students become aware of what they know. Categorizing helps students anticipate and predict the content and organization of the text before they read it. Questioning helps to set the purpose for reading the text. The students will now read the text with the question in mind (K-W-L-H Technique, online).

There are KWL organizers that will work well with this technique. These graphic organizers are a useful guide for reading and research. The use of the organizer will help students to do the following:

- Set purposes for reading
- Pinpoint areas of research
- Verify or correct assumptions about prior knowledge
- Raise new questions

(See appendix A2)

Vocabulary Development
(Grades 1-12)

A very important step that should be taken to improve comprehension in reading is vocabulary acquisition. Vocabulary development has been linked to academic achievement. It is a critical aspect of success in reading. Vocabulary limitations are attributed to the lack of gains in reading. Inadequate vocabulary development can hamper the connections that students need to activate prior knowledge.

Reading instruction that focuses on the growth of children's vocabulary results in an enhancement of their ability to infer meaning and to better comprehend what they read (Rupley, Logan & Nichols, 1998). Children not having access to the meanings of words representative of the concepts and content of what they read causes difficulty in children's comprehension of texts, limits their ability to make a connection with their existing background knowledge, and inhibits their capacity to make coherent inferences (Rupley, Logan & Nichols, 1998).

Words label the concepts that are formed as a result of experiences. Students need a wide range of experiences to develop and expand their conceptual frameworks, and they need an ever-growing vocabulary in order to comprehend increasingly complex subject area material (Abbott 1999).

The use of vocabulary development will activate students' prior knowledge about a word and also a subject. This activation will allow student to make connection between what they already know and the new incoming information. The student is then able to transfer his connection to the task at hand.

Pre-instructing and discussing important vocabulary items and making predictions about relationships between text and content (Swaby 1989) can activate prior knowledge. Vocabulary instruction should focus on semantic elaboration. Students often lack the ability to identify

the associative connection between words. Using semantic elaboration will help to organize information in semantic memory. This will then help students to activate semantic memory to retrieve information to make the connection with new information; thereby becoming concept ready.

This will also help students to have an experience-oriented approach to the concepts that are being developed. The teacher should at this point help the students to relate the new word to the student's prior knowledge. Prior knowledge contributes more to vocabulary learning than memorization strategies (Baker, Simmons, Kameenui 2000).

The following suggested guidelines can serve in pre-instruction (Swaby 1989):

- Encourage students to search their memories for experience with the words.
- Provide an experience oriented context rather than a simple definition of the word.
- Discuss the meaning.
- Show children where the word fits in relation to words or concepts they already have.
- Provide the definition of the word.

Vocabulary development is crucial to the success of comprehension. If students do not have a large vocabulary when trying to understand complex subject area material, they will not understand the information presented. Classrooms should be word-rich environments, places where students see, hear, read, write and use words (Abbott, 1999).

The implication here is that the each day the students must have opportunities to inquire, extend and reinforce word knowledge.

For vocabulary development to be effective in content areas, students should spend at least one class period on the discussion and association of new words introduced. The goal of vocabulary instruction should be to bring depth of understanding. This can be done through the use of some of the following strategies:

(Grades 3-12)

- *Concept wheel/circle* – is an instructional technique that builds on student's background knowledge, encourages brainstorming and discussion, and at the same time visually displays the connection between previous conceptual knowledge and the new word being encountered.
- *Semantic word maps*- helps students explore their knowledge of a new word by mapping it with other words or phrases.
- *Webbing* – a method that graphically illustrates how to associate words meaningfully and allows students to make connections between what they know about words and how words are related.
- *Concept of definition* – enables students to clarify the meaning of unknown terms by using a hierarchical structure to conceptualize the definition of the new term.

- *Semantic feature analysis* – helps students under stand relationships among words and relate their background knowledge to new words.

Teaching Vocabulary in Context (Grades 1-12)

This is a before reading strategy that introduces vocabulary to help access prior knowledge and experiences. When identifying the new vocabulary, take into consideration the background knowledge bases of your students, concepts and ideas central to the text selection, and the readability of the text.

(See appendix A3)

Vocabulary Self-Collection
(Grades 1-12)

This strategy is to encourage long-term acquisition and development of vocabulary. The two major characteristic of the VSC stately are as follows: (1) the strategy focuses on words that are important to students, words they want and need to know, and (2) it encourages students to become independent word learners during their own life experiences (Karlsson-Riordan, 1999).

Vocabulary Log or Journal
(Grades 1-12)

These items provide an efficient method for students to record and learn new words, terms, and concepts. The words may come from the vocabulary self-collection strategy, class discussions, or personal conversations. The journal may include photographs or illustration of word concepts, and sentences containing the words.

Word Sleuthing – this activity encourages students to become word sleuths and investigate the origin and mean of words, terms, phrases, word families, and concepts. Students are invited to also collect words from their home environment and they identify words found in newspaper articles, television or radio shows, advertisement, or on the Internet.

It is very important to teach students the technical and specialized meanings of words.

- General Vocabulary: common everyday words
- Specialized Vocabulary: words that take on new special meanings as they are used in various content areas
- Technical Vocabulary: words that only belong to a particular subject area.

Vocabulary instruction should teach skills, and strategies that would help children become independent word learners (Baker, Simmmons & Kameenui, 1998). It is important that vocabulary instruction be immersed in meaningful reading experiences. This should include teacher directed instruction and appropriate specific skills along with broad reading and writing opportunities (Rupley, Logan & Nichols, 1998).

There are so many strategies to use when developing vocabulary within content area subjects. Students must be taught how to use context clues, phonetic analysis, structural analysis, using a dictionary, configuration clues, and text aids in order to comprehend increasingly complex subject area material.

Research suggests that the organization of a textbook affect reading comprehension. Poorly written textbooks may play a part in the comprehension difficulties of poor readers, those who have difficulty recalling content, organizing information, identifying main ideas, and discriminating between relevant and non relevant information (Dickson, Simmons, Kameenui 2000). Comprehending explanations in expository material requires a different way of reading than narrative text. Therefore the organization patterns of text should be taught as a strategy.

Text organization includes the physical presentation and structure of text. The physical presentation includes visual textual clues such as headings and subheadings, signal words, and location of main ideas in sentences. Text structure involves the organizational patterns of text written to convey a purpose, i.e. persuade, entertain, etc. (Dickson, Simmons, and Kameenui 2000).

Students' awareness of the physical presentation of text will facilitate the student's ability to identify main ideas and interrelationships between important information. It is easy for students to recognize main ideas when they know that main ideas and their supporting details occur in recognizable patterns that show superordinate and /subordinate relationships. The student's ability to recognize the use of physical textual clues such as heading, signal words, an main ideas, help them identify the important ideas in text (Dickson, Simmons, Kameenui, 2000)

It is important that students understand the physical presentation of text. When text gives clear signals of main ideas and relationship between ideas comprehension takes place. Techniques that textbook use to clearly present text include (1) ordering topics systematically; (2) placing topic sentences at the beginning of paragraphs; (3) arranging supporting details in recognizable patterns that exemplify superordinate/subordinate relations; (4) using precise language to make clear the relationships between concepts; ideas, and sentences; (5) using signal words such as first, second, and finally, and (6) using headings, subheading, and topic sentences to cue the interrelationships between important ideas (Dickson,Simmons, Kameenui 2000).

Organizational strategies involve selecting important details and building relationships among them. These strategies are important when constructing meaning from content. These strategies should be used during reading as well as after reading.

Knowing the various textbook patterns will help student become independent learners. Common textbook patterns of organization include listing information, time order/sequence, comparison/ contrast, cause/effect, and definition/example. This information can help students to readily understand the author's intent.

Numerous typographical aids are included in most content area textbooks to assist the reader in determining the organization of the information presented. These include the title subheads, colored panels, sidebars, bullets, use of color type, and words printed in italics or boldface. As readers read, they should interact with these typographical aids.

The use of an outline as a tool in organizing information in text will help students to form a macrostructure of the information. This macrostructure is useful in the organization of propositions in accordance to their relative importance in a hierarchy (Gunning 1996). The outline is a visual reference of what the main ideas and supporting details are in the text (Reading: Reading Comprehension Strategies 1999- online).

(see appendix B and graphic organizers-generic appendix)

Think- Alouds
(Grades 1-12)

This strategy is used to model comprehension processes such as making predictions, creating images, linking information in text with prior knowledge, monitoring comprehension, and word recognition (Gunning 1996).

The teacher is required to teach the students how to use this strategy to monitor comprehension. Students are able to use the strategy to analyze their own learning. This strategy allows the student to become an independent learner.

This method is a great way to foster retention. retention takes place in memory. Memory has three stages: encoding, storing, and retrieving. Encoding must also be rehearsed at different times and different ways. Encoding is accomplished when information has been attended to through manipulation. The additional use of images, and thinking aloud will force the information into long-term memory.

Elaborative encoding helps students to retain information. It involves building association between information read and prior knowledge, or integrating them my manipulating or transforming information. Encoding is accomplished by drawing inferences, creating analogies, visualizing, and evaluating.

Think-alouds work well in instructional grouping. These groups can be formed as cooperative groups; group investigation; peer tutoring; and concept development (Fuentes 1998). The purpose of grouping will allow the students to think-aloud as they read to attempt to solve problems in the text (Vanwilligen 1999). The talking aspect of the think-aloud is giving each student the added advantage of hearing and seeing the text. This extra step will help with encoding, which leads to retention.

Study Guides
(Grades 3-12)

Activity designed to foster understanding of a selection that student read independently. The best guides help students organize information and reflect on it. These guides have more importance to the student when they work to create them. This is another aspect of elaborative encoding.

Pattern Guides/Flow Charting
(Grades 3-12)

A pattern guide is used to foster both retention and understanding. If a student identifies the pattern as main ideas/details organization, they can mentally file the detail under the main idea. These guides allow the students to have visual crated to assist them with comprehension.

These guides can take different forms. A common pattern guide is an outline. The teacher must use direct instruction to teach the students how to use an outline as a pattern guide.

Summarization
(Grades 3-12)

Summarization builds on the organizational strategy of determining main ideas and supporting details. This strategy improves comprehension and increases retention. It allows the student to reflect on what has been learned by writing it in his/her own words.

Predicting

This is a strategy that helps readers set a purpose for reading. It activates a reader's schemata. This strategy can and should be taught even before children can read on their own. The teacher should teach students what kind o questions to ask. Making predictions requires prior knowledge.

QAR (question-answer-relationship)
(Grades 3-12)

Students use a system of comprehension questions that are categorized according to how and where the answers are located. This strategy gives students a platform in which to begin looking for answers to comprehension questions. Using this strategy will help them to come up with answers more quickly.

This is a relationship in which questions are described as having four levels, based on where the answers are found. The strategy is designed to encourage students to understand the thinking processes and demands of questions and learn how to access information sources in responding to different types of questions (Raphael, 1984). The QAR strategy classifies different types of questions into four categories of information sources: factual, interpretive, applicative, and transactive. The levels are as follows:

- Right There – The answer is stated directly in the text and requires simple factual recall.
- Think and Search – The answer is in the text but not stated directly. The reader

must interpret the meaning and formulate the answer after reading different parts of the text.

- Author and You – The answer is not in the text. The reader needs to integrate background knowledge and experiences with information the author provides.
- On My Own – The answer is not in the text. The reader must develop the answer based on background knowledge and experiences only.

This strategy will increase comprehension, as students are introduces to the concept and taught how to locate the source of answers.

Question Generation
(Grades 2-12)

An effective strategy for fostering comprehension. It transforms the reader from passive observer to and active participant. Creating questions also foster active awareness of the comprehension process.

The SQ3R (survey, question, read, recite, and review) strategy is an excellent way to have students generate questions. The second step in the process is to turn headings into questions that may be answered in the reading. This strategy coupled with the QAR offers students exposure to the text in different ways.

Restatement/Backtracking
(Grades 3-12)

Teacher should model- plus- explains this strategy using direct- instruction. There are five step in the process: 1) rephrasing using inferred equivalents where unknown words appear 2.) paraphrasing in simpler terms 3.) inferring superordinate propositions 4.) paraphrasing with inserted referents 5.) periodic summarization.
Backtracking has two steps in its process: 1.) reread from beginning of confused segment 2.) reread previously comprehended parts.

Reading Grid
(Grades 3-12)

A reading grid provides a template for taking notes from chapters in science/history texts. The reading grid is a matrix divided into enough boxes to cover all the sections in a chapter. The grid is helpful because it breaks the task of reading a chapter into smaller, more manageable parts. Information is processed more completely when it is summarized and transcribed into the student's own words (Reading and Memory strategies, online).

Monitoring
(Grades 4-12)

Monitoring helps students to know when and where to use various strategies to enhance comprehension. This is what is also known as metacognition, or metacognitive awareness. It helps a student to self-assess what they now and how they know it.

The concept of metacognition entered the field of cognitive psychology with John Flavell. Flavell felt that metacognition-included knowledge and regulation of cognition. Knowledge about cognition consist of: 1) person variables, or knowledge about one's self, and other thinking; 2) task variables, or knowledge that different types of tasks exert different types of cognitive demands, and; 3) strategy variables, or knowledge about cognitive and metacognitive strategies for enchancing learning and performance. When a student begins to develop self-awareness, they are developing his/her intelligence. Metacognitive awareness has to be built into reading instruction (Nature of Metacognition, online).

Monitoring helps to develop thoughtful readers who planned selectively, monitor comprehension while reading, and reflect on the process and content after reading. The use of summarization is one useful strategy that will help students to reflect on the content. Self-questioning allows the student to reflect on the process of what they know and how they know it (Metacognition and Its Relation to Reading, Online).

Reciprocal Teaching
(Grades 4-12)

Reciprocal teaching introduces group discussion techniques created to improve understand and retention of the main points of a lesson. There are four techniques used to build comprehension: predicting, question generating, clarifying, and summarizing. It takes pack in the form of dialogue between the teachers and students. In this dialogue the teacher and student take turns assuming the role of the teacher in leading the dialogue about a passage of text. The four strategies are used at this point. The teacher is responsible for initiating and sustaining the dialogue through modeling and thinking out loud. This strategy can be used with cooperative grouping once students have acquired enough practice (Knuth, Jones 1991)

Directed Inquiry Activity
(Grades 4-12)

The teacher develops a list of inquiry questions about the text to be read and the students preview the text to make predictions. After reading the text, students reexamine inquiry questions and refine responses (Thomas, 1986).

Writing to Learn
(Grades 2-12)

Writing summaries after reading chapters can help students to more easily attach a word to their conceptual framework. Writing reports on people and event will give students a way of thinking, and a way of exploring their interest in a person or event. Students can have written summaries and interpretation of the results of as science experiment conducted in class. They can write a letter that is persuasive. This is really good because you can get students involved in civic issues. This will help them to take the role of an activist when they become adults. Another way is to have the students engage in writing essays on social studies or science topics. Devise a questionnaire and have the students write a summary of the result of the classroom poll. Take them outside and

have the class write about birds they saw. There are all types or writing prompts. The key is to get students writing. It is the connection between reading and comprehension. Prewriting strategies such as brainstorming or clustering should be taught.

Journal Writing
(Grades 2-12)

This activity provides an opportunity for students to freely write about topics of their choir or units of study in the content areas. Journal writing is a more personalized form of writing, usually involving the student and teacher (Karlson, 1999). It allows student to record their thoughts and opinions and work out confusion about various topics. This activity is excellent when used to reflect on how a math problem was solved.

Quick Write
(Grades 2-12)

This is a format that encourages student to respond quickly (within three or four minutes) to a question, statement, dialogue, class discussion, or reading passage.

Double –Entry Journals
(Grades 5-12)

The double-entry journal is a form of writing that requires student to initially respond to a question, a controversial issue, or a text selection and revise or add onto their ideas after further research. It requires a notebook that allows student to begin with two facing pages. Student can use the left page for initial brainstorming ideas, understanding interpretations, drawings, maps, or notes. The right page is reserved for refined understandings and interpretations of the information recorded
on the left page. This allows the student to see how their ideas and understandings evolved. It is a useful guide for content reading and writing lesson or units and can help students develop and organize their thoughts and ideas.

Guided Writing (Expressive Writing) (Grades 3-12)

The guided writing strategy helps students think about content area topics through expressive writing, which is "thinking aloud on paper" (Prenn and Honeychurch, 1990). It provides an opportunity for students to connect their prior knowledge, experience, understanding, and interpretations with content area information. The teacher reads a variety of writing prompts that encourage students to assume roles and imagine scenes in a topic-related mini-drama. The questions within the prompt guide students in the discovery and exploration of the connections between their background knowledge and experiences with feelings and beliefs in relation to the topic.

Beginning Researchers
(Grades 2-12)

This strategy encourages student to become researchers and to move away from the informational report writing modes (Maxim, 1990). There are three phases to the program: Phase one is taking notes and developing research ideas from listening: Phase two is reading and taking notes; phase three is initiating and carrying out research.

Learning Logs
(Grades 5-12)

These are a type of journal in which students record and reflect upon concepts and skill that they are studying. This device combines personal reaction with exploration of content. The main purpose is to have students examine and express why they are learning. The learning log is a specialized form of journals that specifically focuses on content area learning. The purpose is for students to record brainstorming ideas from content-directed reading-thinking activities. The learning log is a great place for students to create concept webs or semantic maps (Karlson 1999).

Constructing Analogies
(Grades 4-12)

An analogy shows the relationship between words. This strategy can help students bridge the gap between the new and the old information. Self-created analogies are often more effective than ones given by others.

Creating Graphic Organizers
(Grades 3-12)

Graphics organizer can be an effective tool for thinking and learning, especially for visual learners and students with limited language skills. Organizers are useful both in reading and in preparing for writing.

These organizers are visual devices designed to help readers note relationships between key concepts or events in a selection. These organizers help students to understand and retain complex content area information. They can help students organize and present their ideas with clarity. Reading with a graphic structure in mind will help student to comprehend and summarize information more effectively. They also do the following:

- Represent stated or implied information in concrete form.
- Shows various types of relationships among facts ideas.
- Provides a focus for gathering information and ideas.
- Assist in organizing ideas.
- Helps relate new information to prior knowledge.
- Facilitate discussion.
- Provides a means of storing information for review.

There are different types of graphic organizers. You choose the one that addresses the need of the learner. I will list just a few of the different types that can be used. They are as follows:

- Analysis Map - is used for analyzing vocabulary and characters.
- Series of Events Chain – used when ordering actual events or events in fiction.
- Timeline - is most often used for developing a chronological narrative or composition.
- Venn Diagram – useful for developing a comparison- and –contrast composition.
- Matrix – shows similarities and difference between two or more thins, people, places, events, concepts, process, etc.
- Cluster – useful tool for brainstorming.

(See appendix C1-C5)

Apply and Extending
(Grades-2-12)

Encouraging student to read books that explore the topic in detail can do this. Students can use children's books and periodicals. Periodicals are important in social studies because they usually have current information about a topic. Enrichment, and hands-on activities are another way to extend a lesson (Loranger, 1999).

Fostering Retention

Researchers have learned a great deal about the cognitive process involved in learning. It has become evident that students should learn about their own cognitive process and how to use them in ways to facilitate learning. Therefore, students should be taught how the brain processes information.

One important cognitive theory is that of humans as information processors. This cognitive theory of learning describes the processing, storage, and retrieval of knowledge from the mind. Having an understanding of how people process information and acquire new knowledge and skills is essential to the practice of instruction (Slavin 1986). According to the theory, information that is to be remembered must first reach a person's senses, then be attended to and transferred from the sensory register to the short-term memory, component of memory where limited amounts of information can be stored for a few seconds, then processed for transfer to long-term memory, component of memory where large amounts of information can be stored for long periods of time.

One way to hold information in short-term memory is to think about it or say it over and over. This process of maintaining an item in short-term memory by repetition is called rehearsal. Rehearsal is important in learn because the longer an items remains in short-term memory, the greater the chance it will be transferred to long-term memory. Without rehearsal, item will not stay in short-term memory for more than about thirty seconds (Slavin, 1986). The need

to rehearse new information is important to instruction. Teaching too much information too rapidly is likely to be ineffective because students do not have time to rehearse each new piece of information, later information is likely to drive it out of their short-term memories (Slavin, 1986).

According to the information processing theory, long-term memory is thought to be a very –large-capacity, very long-term memory store. Theorists divide long-term memory into three parts: episodic memory, stores images of our personal experiences, semantic memory, stores facts and general knowledge, procedural memory, stores information about how to do things.

Episodic memories are often difficult to retrieve. This is because most episodes in our lives are repeated so often that later episodes get mixed up in memory with earlier ones.

Information in semantic memory is organizes in networks of connected ideas or relationships, called schema. A schema is like an outline with different concepts or ideas grouped under larger categories (Slavin, 1986). An implication of this theory is that new information that fits into a well-developed schema is retained far more readily than information that does not fit into a schema.

Procedural memory is the ability to recall how to do something, usually a physical task. This type of memory is stored in a series of stimulus- response pairings.

Another theory that cognitive psychologist accept is the levels-of-processing theory. This theory links recall of a stimulus with the amount of mental processing it receives. The more we attend to the details of the stimulus, the more mental processing we do with a stimulus, and the more likely we are to remember it.

This theory also has links to the dual code theory of memory, which states that information is retained in long-term memory in two forms: visual and verbal. The theory suggest that information coded both visually and verbally is remembered better than information coded in only one of those two ways.

Cognitive psychologist focus on the cognitive processes involved in learning, thinking, and motivation. Their theories can help teachers incorporate instructional methods that will help students to facilitate their own learning. This knowledge can help students become independent learners.

Attending to incoming information is the first step in learning something new. Students are given a lot of information during the course of the school day. It becomes impossible for students to process all the information they are given. Cognitive psychologists recommend that students be taught the importance of selective attention. Teaching students that they can use varying levels of attention will help them decide when to focus their attention. Students must be taught how to make decision on what is important and what is not important.

Psychologists theorize that there are two types of memory, corresponding to different brain structure, short-term and long-term memory. The theory suggests

that only a small amount of information can be stored in short-term memory, and it is quickly forgotten. Psychologists believe that permanent learning requires a transfer of information from short-term memory to long –term memory. Students must act upon information in order to store it in long-term memory. When information is processed deeply, it is better stored in long-term memory and easily retrieved. If a student reads the textbook definitions or repeats them several time, cognitive processing will be superficial. This information would not be securely stored in long-term memory.

The principles of memory are as follows: 1) Get a clear, meaningful encoding of the information; 2) Have a purposeful intention to learn; 3) Organize and elaborate information so that it will have a greater number of meaningful connections; 4) Overlearning aids retention. This mean that the student continues to study after the material is learned; 5) When it is not possible to structure meaning connections between material use mnemonics and other memory devices; 6) Give your mind a rest after intensive studying (Gunning, 1996).

Memory Devices
(Grades 3-12)

Rehearsal is the simplest memory device. It may be used when conceptual understanding is not possible. Rehearsal works because it focuses the learner's attention on the item to be learned and transfers material into long-term memory.

Mnemonic strategies are systematic procedures for enhancing memory. They are used in developing better ways to take in (encode) information so it will b much easier to remember (retrieve). Research has demonstrated that the way we encode information when we study facilitates memory better. The task in developing mnemonic strategies is to find a way to relate new information to information students have locked in long-term memory. Mnemonic strategies are designed to improve memory, but students trained on these strategies perform better on the comprehension part of a test. This comes because they have memorized the facts; therefore they are able to apply this information to the comprehension part of the test.

Student should be taught how to remember as well as what to remember. This can be done through many different strategies, the most powerful have been the keyword method, the pegword, and letter strategies. Continual instruction using mnemonic strategies for important information, as well as instruction in independent use of mnemonic strategies can lead to success for students with learning and memory problems.

Paired-Associate Learning – involves the linkage of two items in a pair so that when one is presented the other can be recalled.

Stimulus Coding – using aspects of stimuli and mental images to promote recall.

Loci method – a strategy for remembering lists by picturing items in familiar locations.

Massed practice – technique in which facts or skills to be learned are repeated many times over a concentrated period of time.

Overlearning – is one of the most important ways to retain information for a long term. The most critical aspect of this method of improving retention is how well the information was learned in the first place. The method requires that new knowledge or behaviors are practiced after mastery is achieved (Slavin, 1986).

Study Skills

The need for systematic instruction in study skills becomes more compelling when we look at the characteristics of today's students. A large percentage of students are from disadvantaged, ethnic minority backgrounds. These students are not prepared to meet the demands of conventional schools. Study skills are important because they help students facilitate their own learning. These skills also help students become independent learner (Gall, Gall, Jacobsen, Bullock, 1990).

Expressive Study Skills
(Grades 4-12)

Note taking is an essential study skill. Notes should be taken while reading and listening. It is important to review notes periodically. Check the notes for accuracy and completeness after each class (Rooney, 1999).

Note taking that requires some mental processing is more effective than simply writing down what was read. Put notes in conceptual forms helps to make note taking more effective. This is where graphic organizers would help students to do this (Slavin, 1986).

(See appendix D1-D5)

Knowledge Mapping – is drawing a diagram of the information. This is good for those who are better at recalling form or shape than they are at recalling words.

Outlining – is used as an aid for memory. It is a blueprint for easy recall, and an organizational frame for the text. Outlining present the main points of the material in a hierarchical format, with each detail organized under a higher-level category (Slavin, 1986).

SQ3R/SQ4R is a five step theory- based study strategy. It is the most thoroughly documented and widely used study technique. It is very effective when properly applied.

The SQ3R is an acronym for the five steps that the process entails. The steps are as follows:

- Survey – the text headings quickly to acquire a conceptual map of the material to be read.
- Question – turn heading and subheading into a question
- Read – sets purpose – read to answer the questions you asked.
- Recite – by making brief notes about the text or using self-recitation.

- Review – rereading notes and by generating and answering questions. This is to be done if you do not understand the material in the step recite.
- Reflect – thinks about what you know and how you know it (this brings in metacognitive skills.) This can be done through written summarization.

The part of this strategy that requires the students to recite the information aloud, works well with paired learning. This supports the "Dual code theory of memory". This key is to have the students recite aloud. They are not only seeing the information again; they are hearing it as well. It becomes highly motivational as the students share the information with each other.

This study technique also requires the students to visit the information several times before reading the content. This gives more rehearsal time to the incoming information. The constant rereading of the information forces the information from short-term memory to long-term memory. This allows for the easy retrieval of information through recognition and recall.

(See appendix E1)

Hands –On Activities
(Grades 1-12)

The multiple intelligence theory suggests that teachers should use centers and projects to aid in comprehension and retention. Some of these activities are as follows: use music to communicate, conduct an interview or survey, create a slogan, create audio tapes, write letters, conduct experiments (science and mathematics), create computer programs or graphics, make a photo album, create a mural, prepare survival kits, adopt animals and take care of them, and role play explorers.

Brain-Based learning allows for the use of colors, music, aromas, water sounds, food, lighting and water in the classroom to control the environment in which students learn. Adding these things to the classroom will make the classroom a brain- friendly environment for learning (Vanwilligen, 1999).

Assessment
(Grades 1-12)

The purpose of authentic assessment should be to find out what students can do as well as what they like to do. *Authentic* assessment of learning should be tied to instructional goals. Science and mathematics can use this method of assessment through hands-on activities.

Portfolios are another way that students can be assessed on instructional objectives. This form of assessment allows the student to decide what entries to put in his/her portfolio. This adds a personal touch (Vanwilligen, 1999).

Groups can be formed to complete complex task, This type of assessment allows for group interaction.

Remember assessment should be used to monitor student learning and to adjust instruction.

Appendix A

Prior Knowledge Topic Survey
Anticipation/Reaction Guide

Instructions: Respond to each statement twice: Once before the lesson and again after reading it

Write + if you agree with the statement.
Write – if you disagree with the statement.

Topic: _____

Statement Response Before Lesson :

1. ____
2. ____
3. ____
4. ____
5. ____

Statement Response After Lesson:

1. ____
2. ____
3. ____
4. ____
5. ____

KWL

Topic

_____

_____

What I **K**now	What I **W**ant to Know	What I **L**earned

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Vocabulary Development

Name_____
Course_____
Date_____ Textbook_____
Chapter_____ Page_____
Words to be defined:

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.

Contextual Use:
Context clues before the word_____
context clues after the word_____
Did you understand the words used as context clues? If not, list those words **here**._____

Dictionary Skills:
Root_____**Meaning**_____
Prefix_____Meaning_____Suffix_____Meaning_____
Syllabication Pattern_____part-of-speech_____

Thesaurus Skills (for each word)
Synonyms_____ Antonyms_____

Definitions from the textbook:

Definitions written in your own words:

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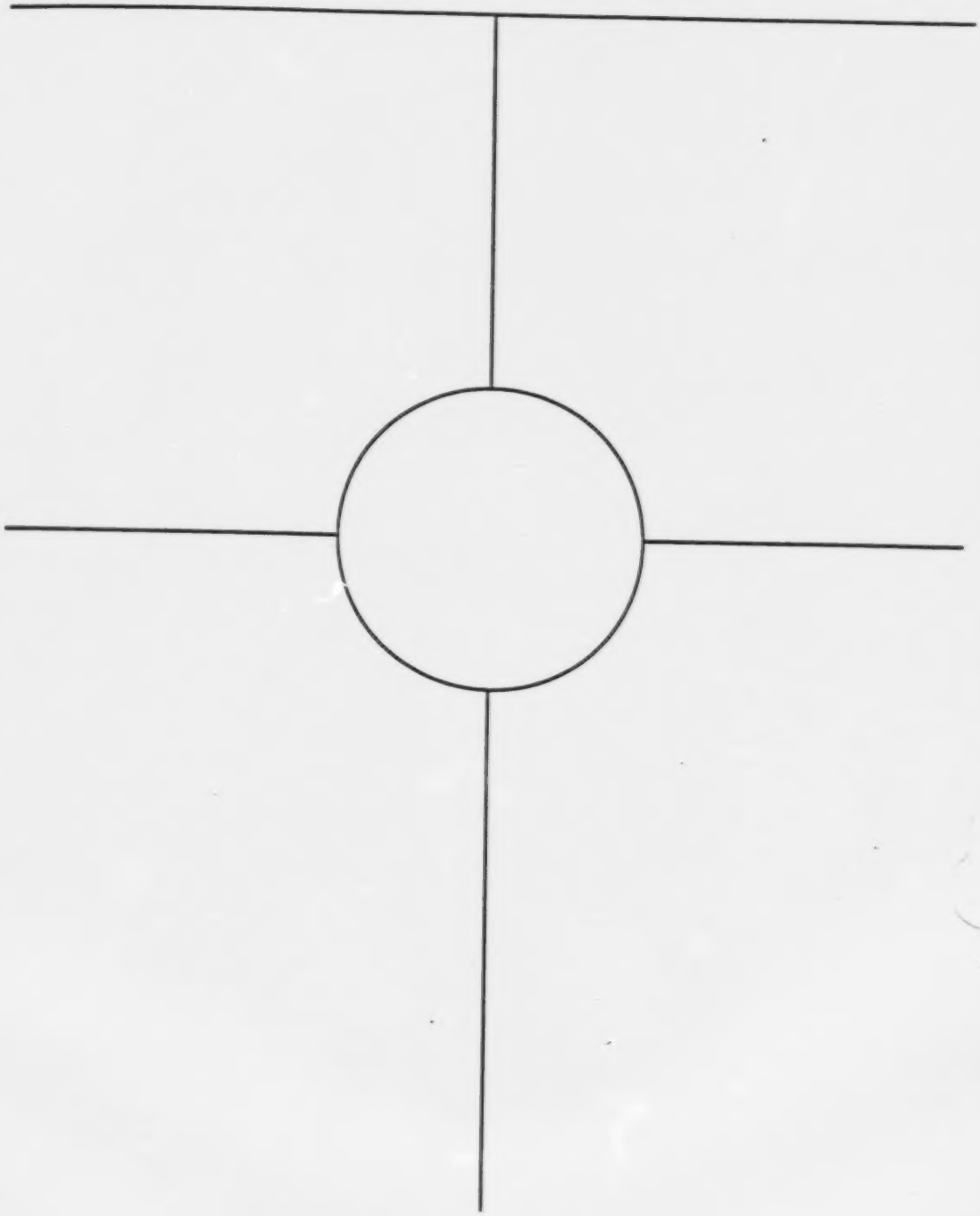
Appendix B

DESCRIPTION

TOPIC SENTENCE:



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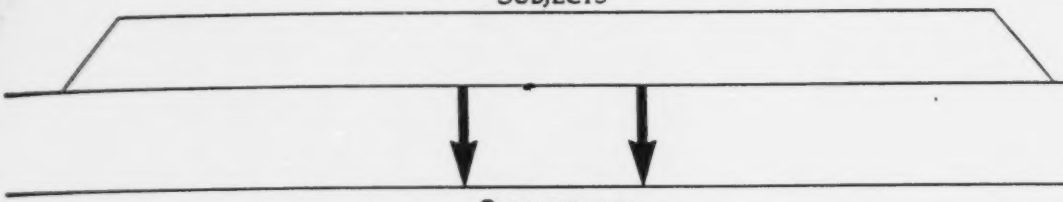
COMPARISON/CONTRAST

TOPIC SENTENCE:

SUBJECTS



SIMILARITIES

DIFFERENCES

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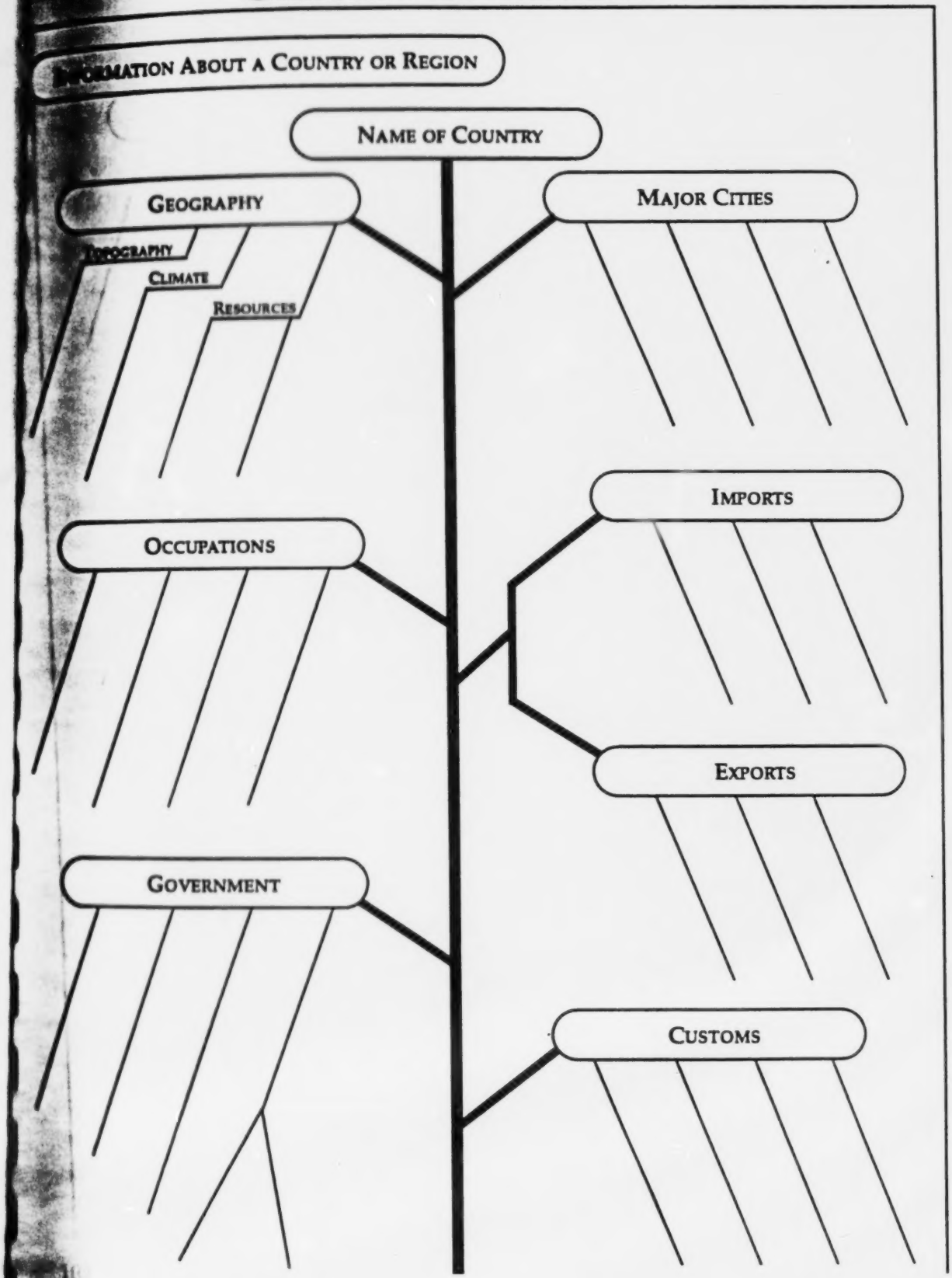
GRAPHIC ORGANIZER • "TREE OUTLINE"



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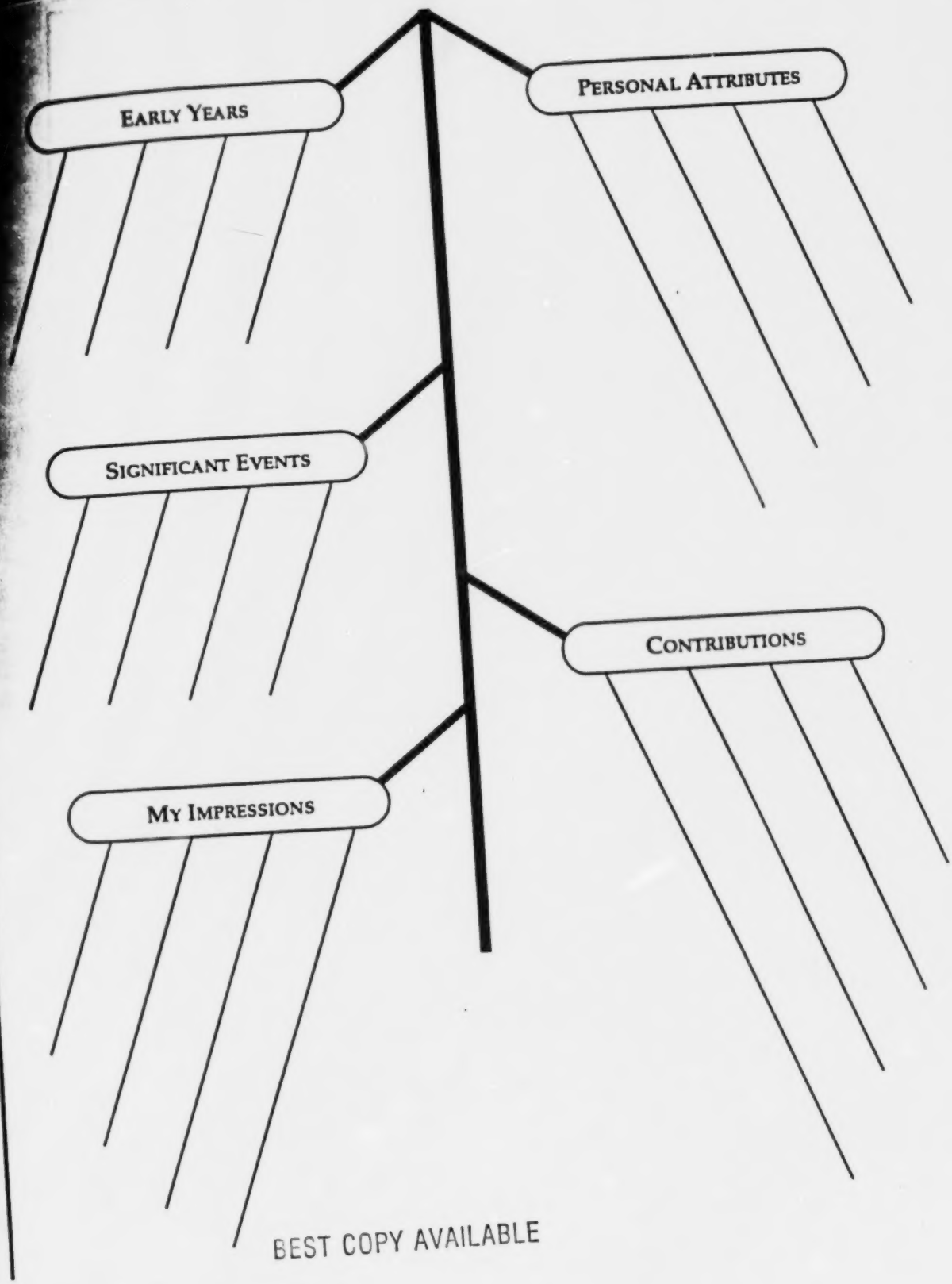
PHIC ORGANIZER • BIOGRAPHY



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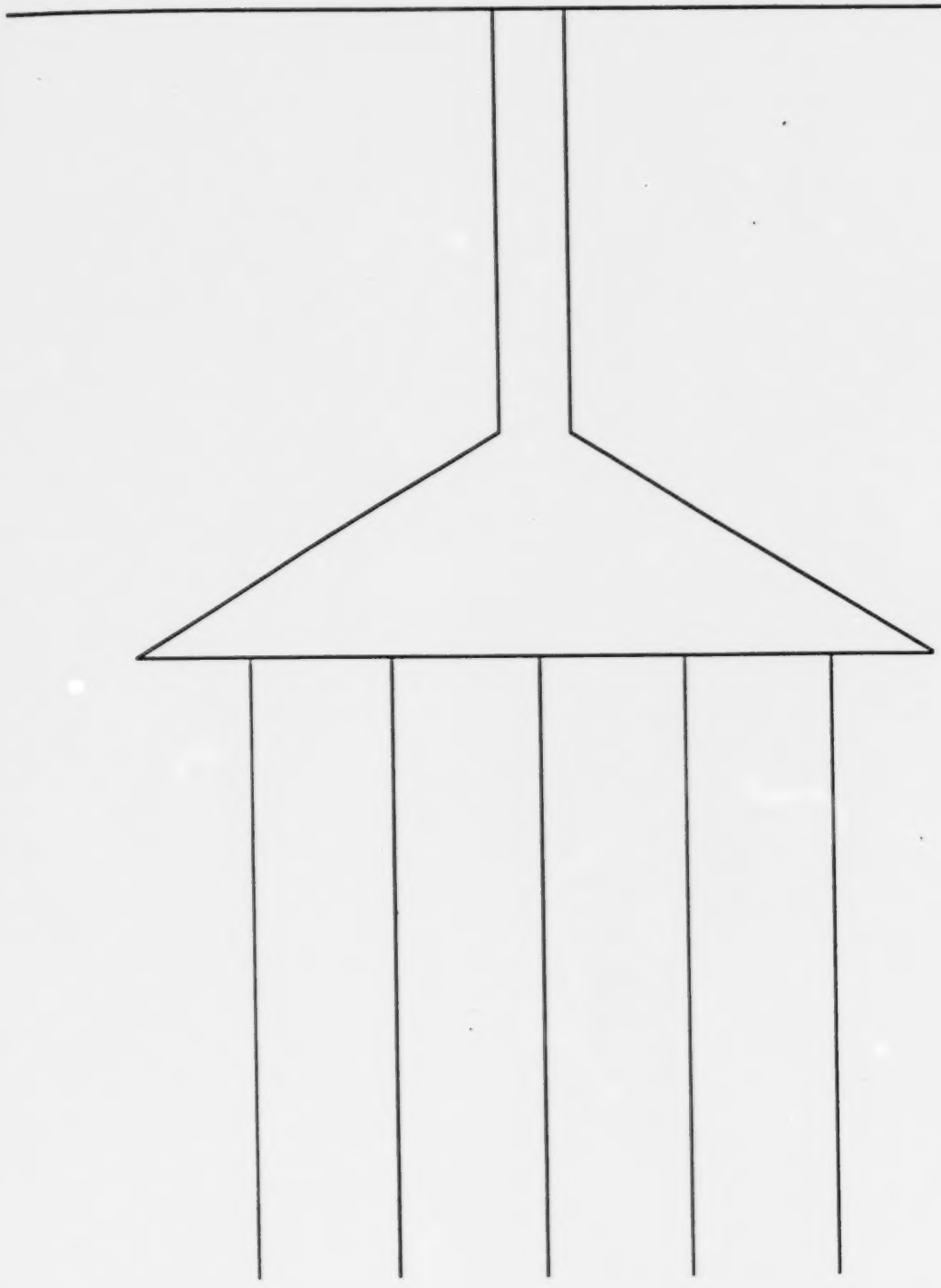
ENUMERATIVE

TOPIC SENTENCE:



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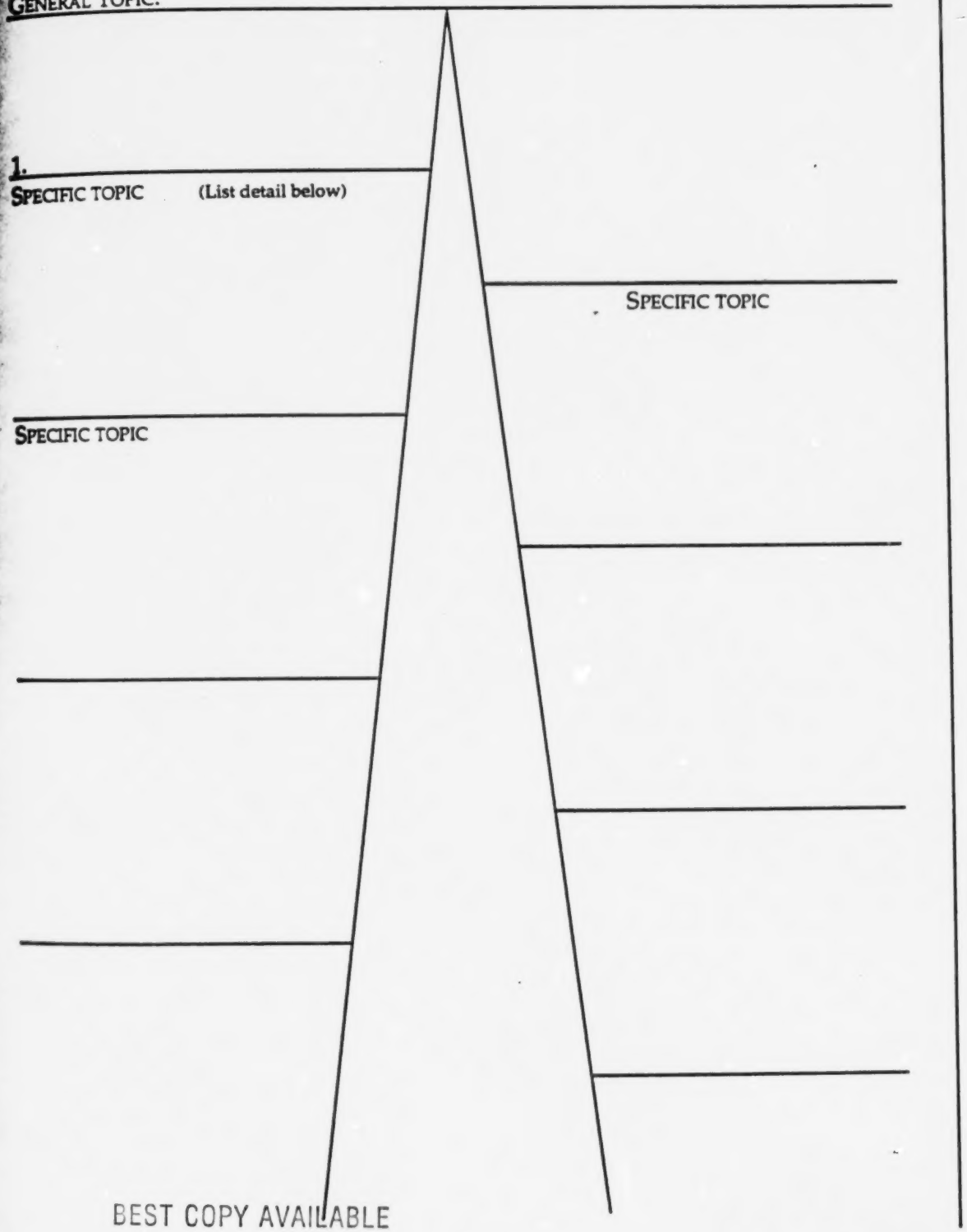
SEQUENCE



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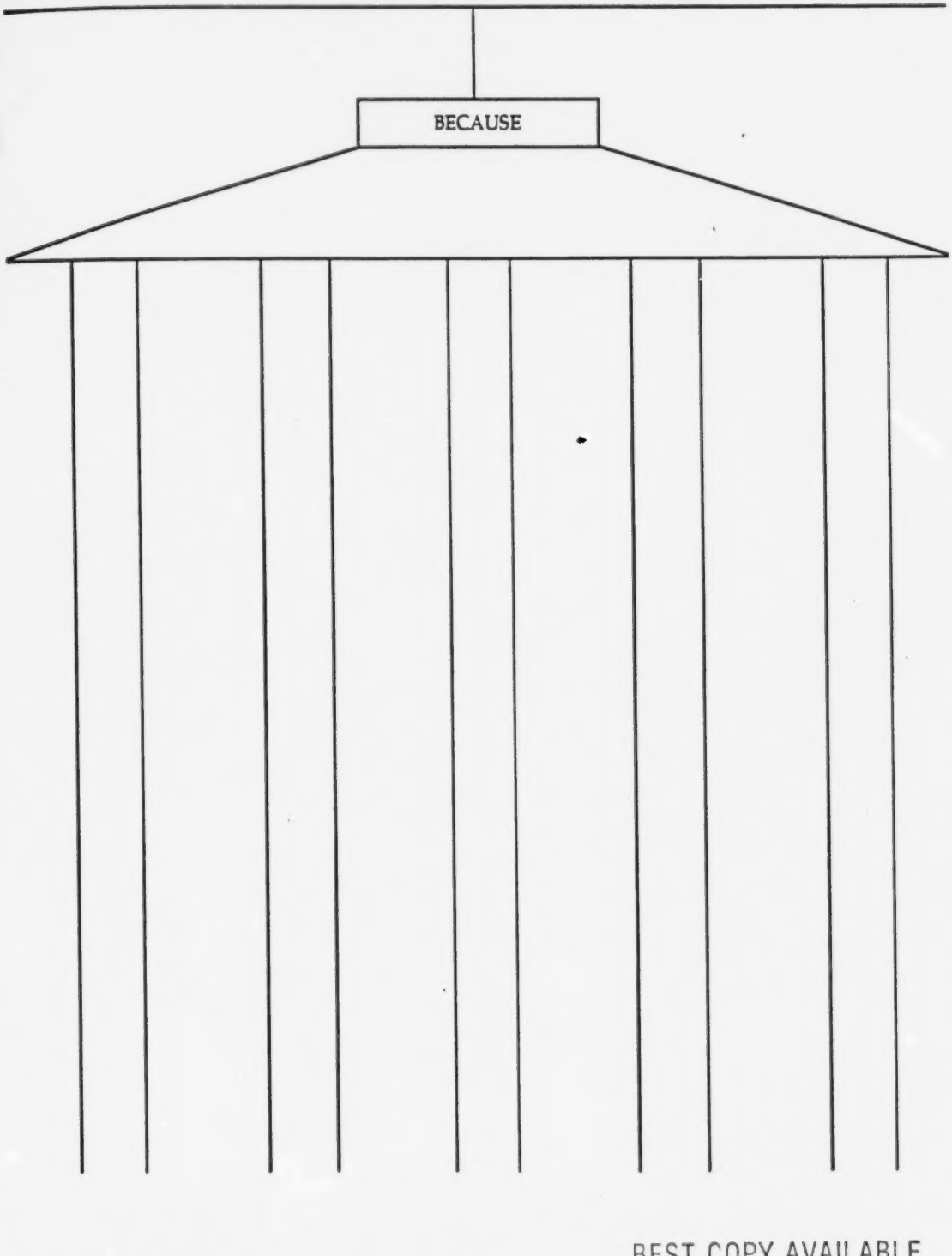
CAUSE/EFFECT

TOPIC SENTENCE:



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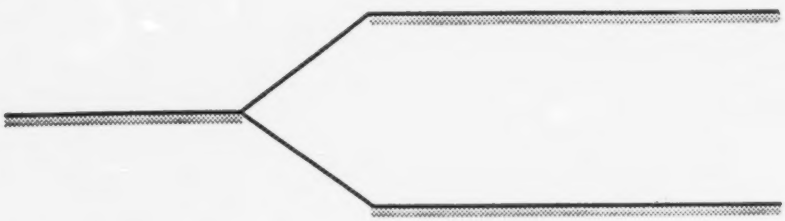
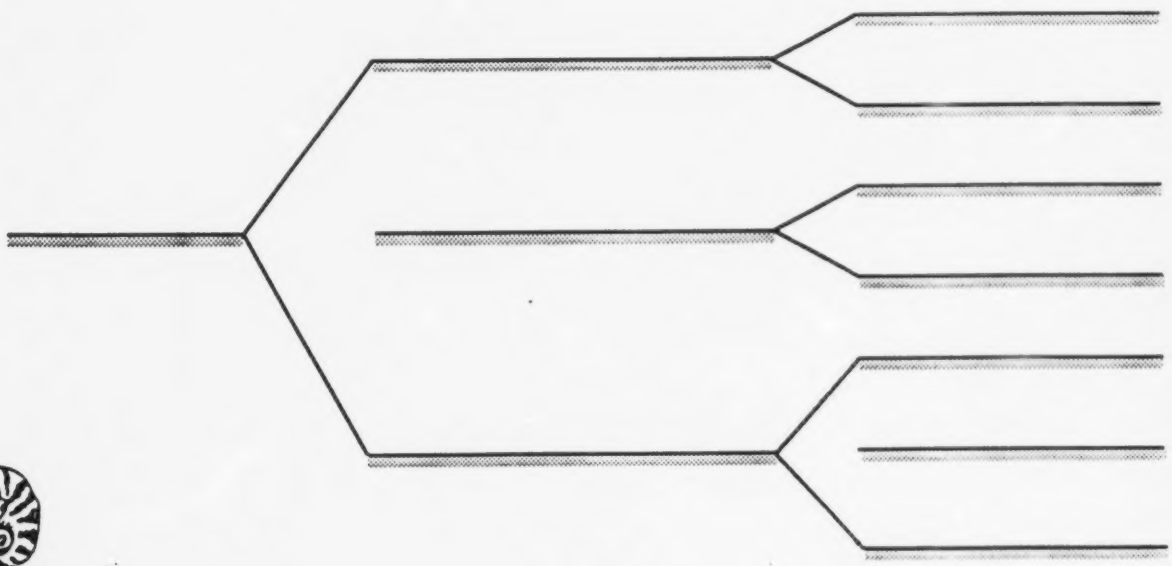
Graphic Organizer

Main Ideas **Supporting Ideas** **Details**





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Graphic Organizer

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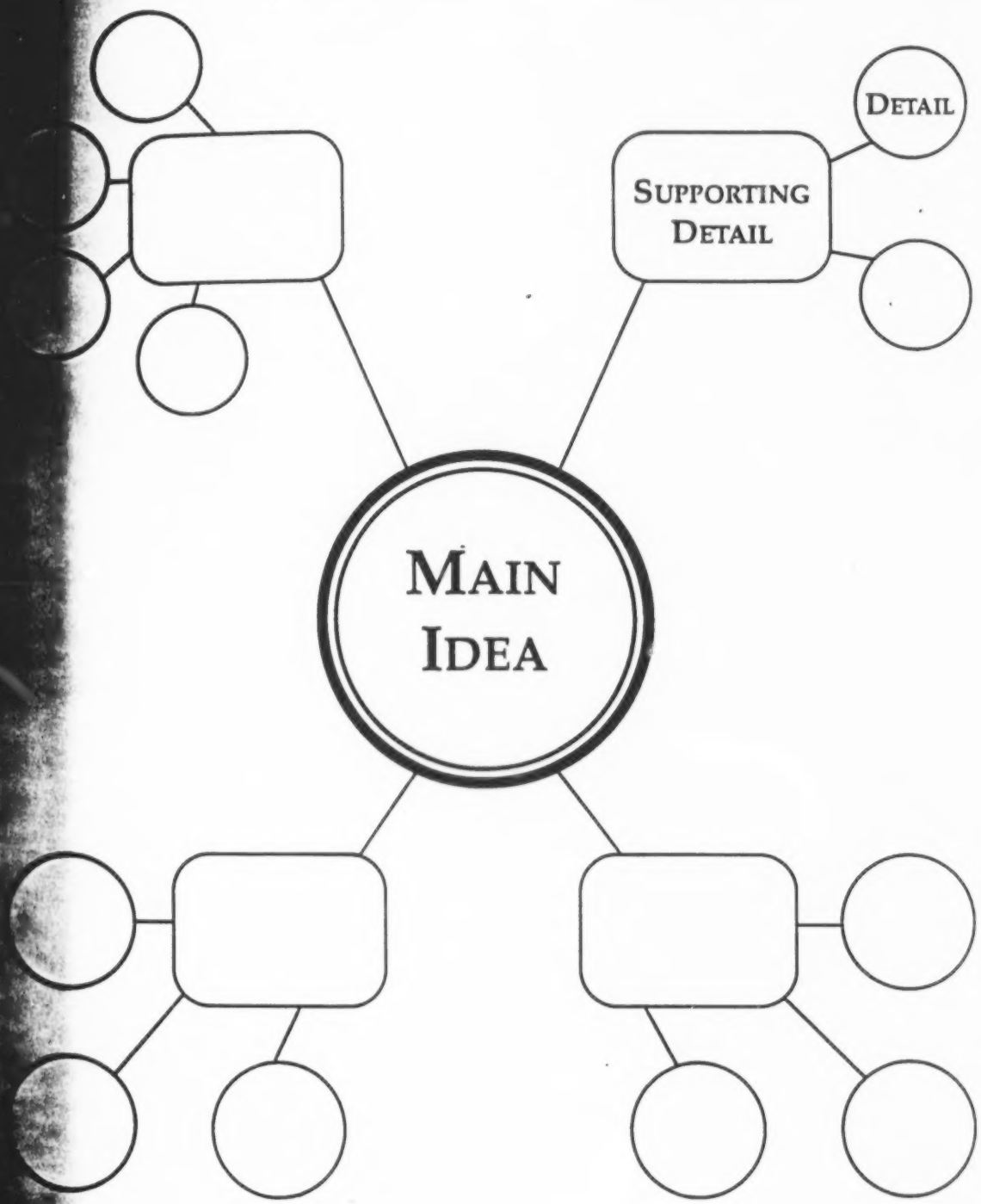
Graphic Organizer "Mind Map"



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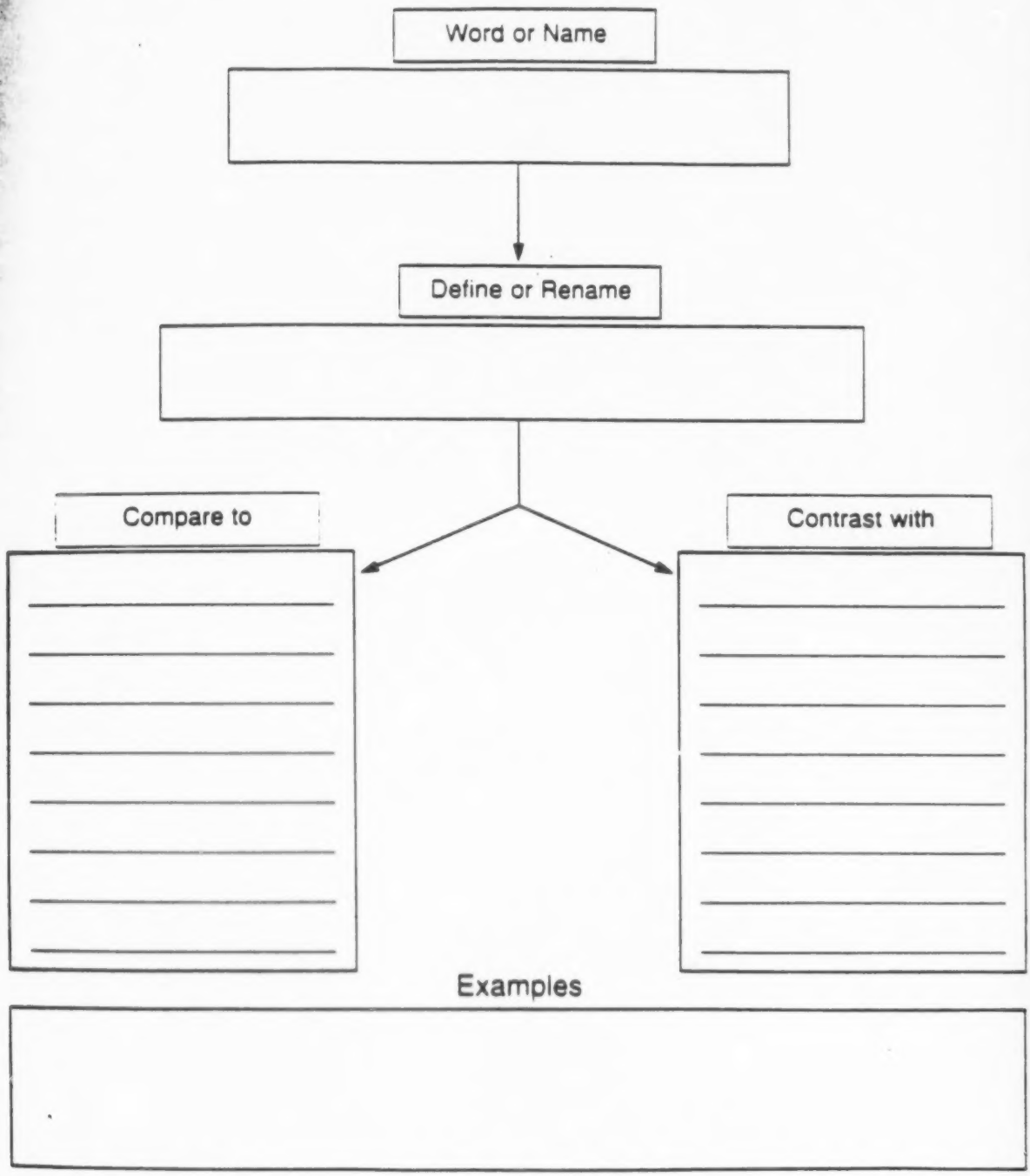
Appendix C

Analysis Map



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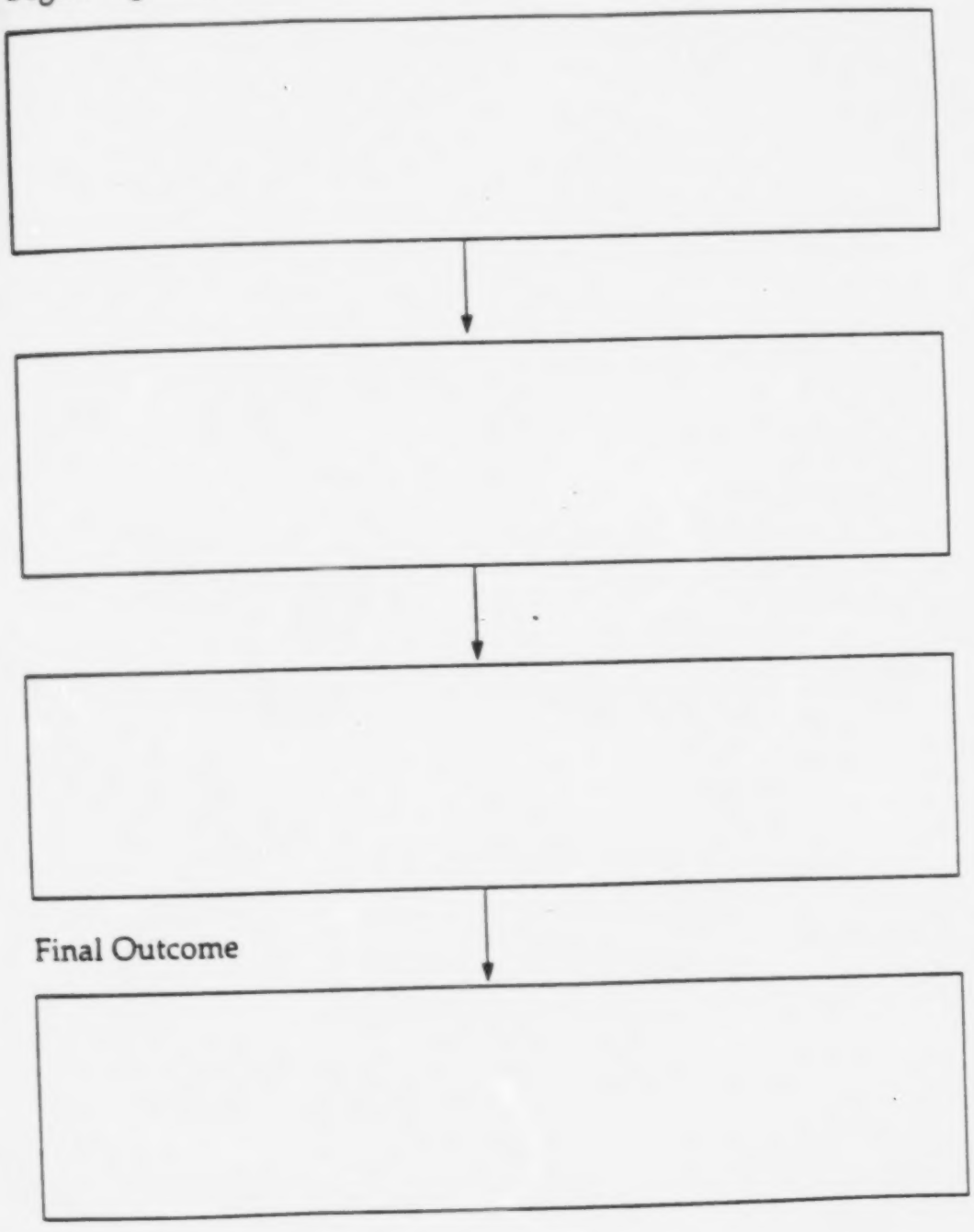
Series of Events Chain

Beginning Event



Final Outcome

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...eline

Time Passes in [ ]

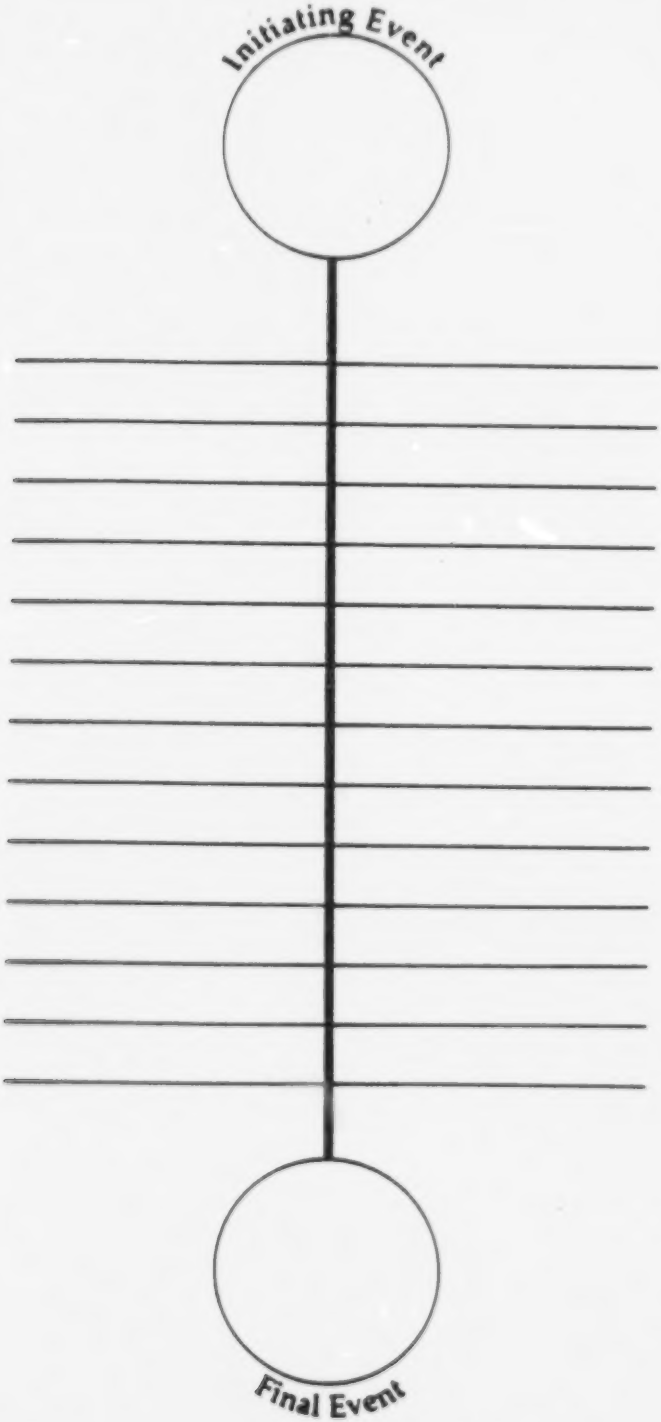

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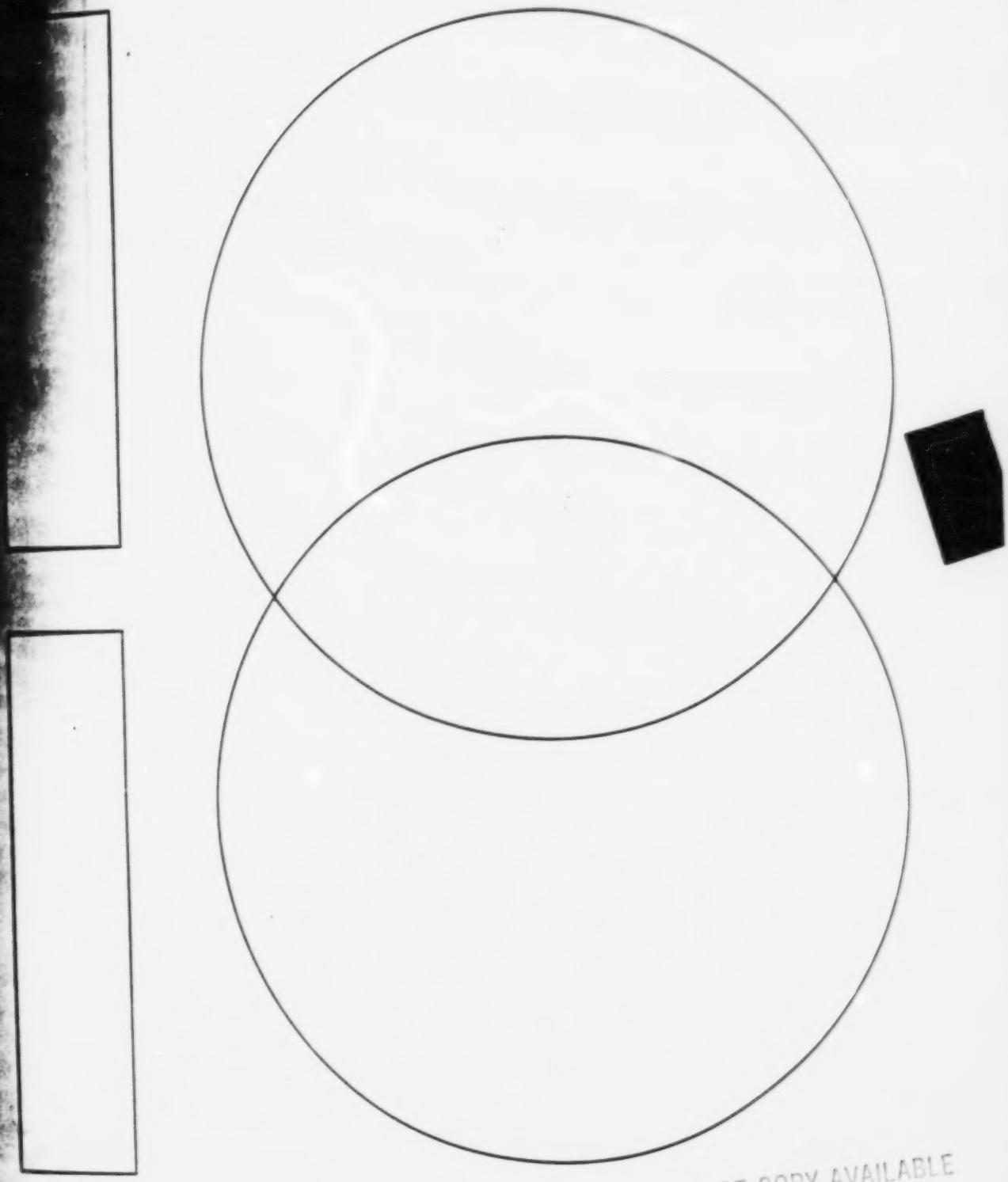
Diagram



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Cluster

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Appendix D

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Questions/Comments	Notes

Summary/Reflection

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Classical Outline

I.
- A.
- B.
- C.
  1.
  2.
  3.

II. A.
- B.
  1.
  2.
     a.
     b.
     c.

III. A.
  1.
  2.
  3.
     a.
     b.
        1.
        2.
           a.
           b.
           c.
- B.

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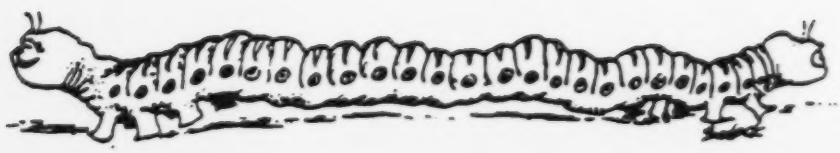

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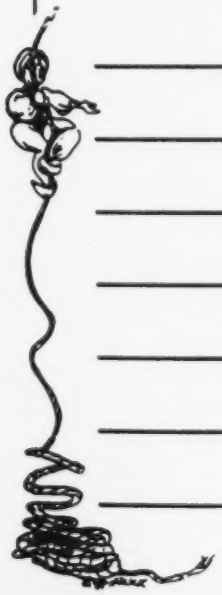
The Divided Page



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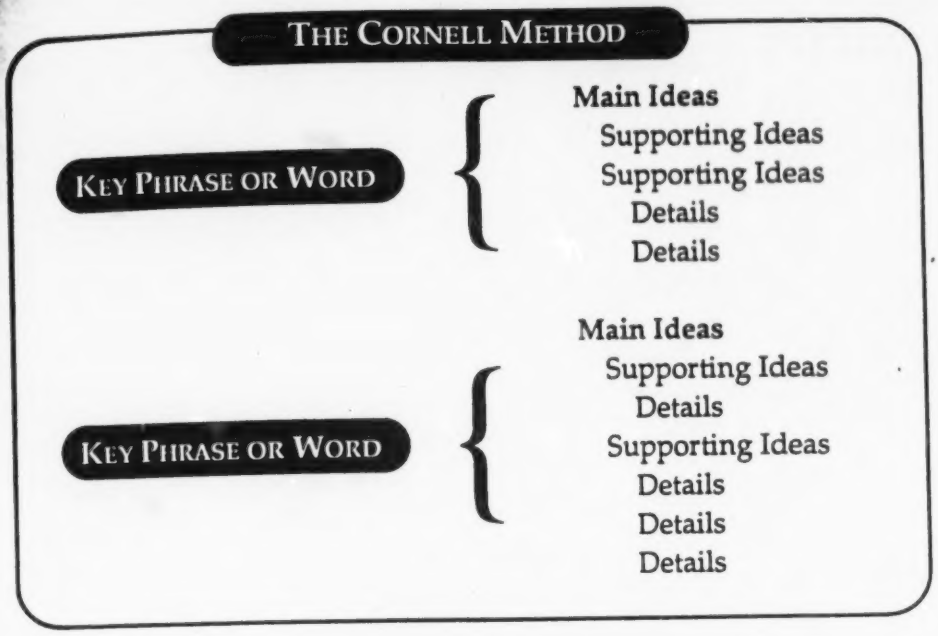
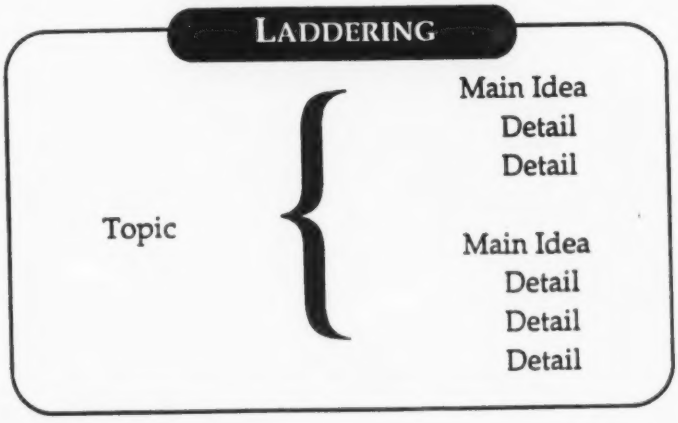
D-2

Sample Forms for Note-Taking

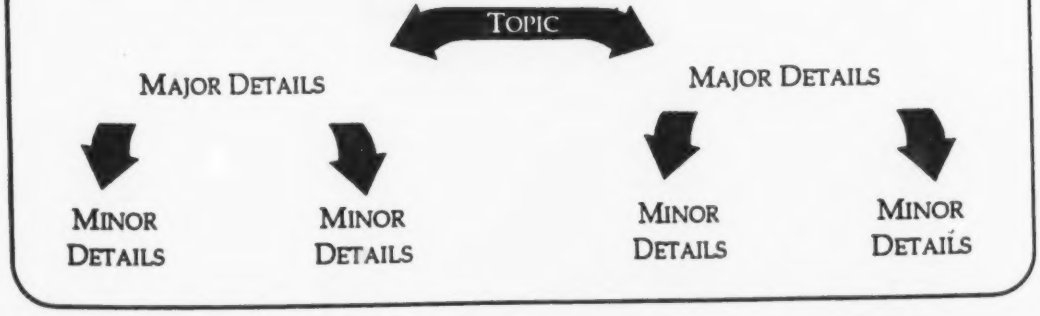
The Cornell Method



Laddering



Tree Diagram



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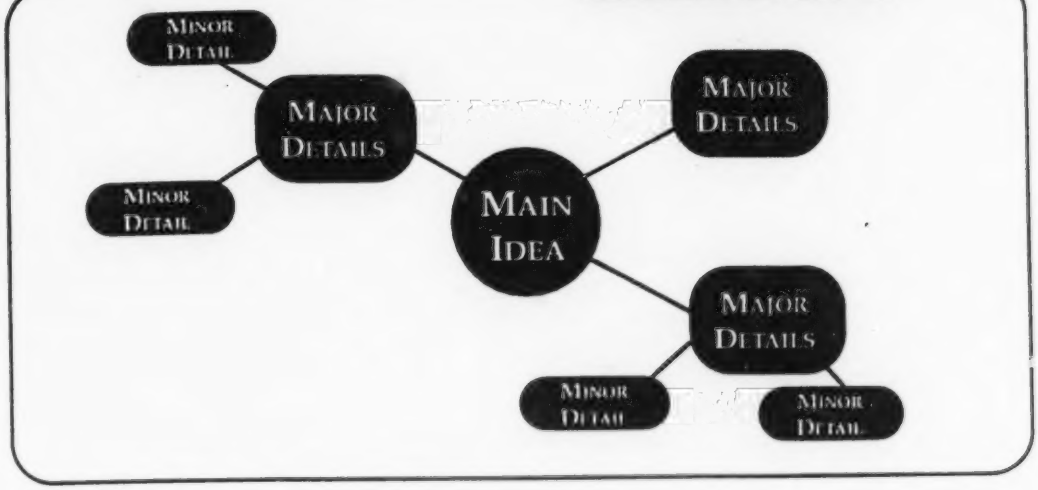
SAMPLE FORMS FOR NOTE-TAKING *continued*

MAPPING



SEQUENCING

MAIN IDEA → MAIN IDEA → MAIN IDEA

DETAIL → DETAIL → DETAIL

SEQUENCING (VERTICALLY)

MAIN IDEA

↓

MAJOR DETAIL

↓

MINOR DETAIL

↓

MINOR DETAIL

MAIN IDEA

↓

MAJOR DETAIL

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D-5

Appendix E

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SQ4R Worksheet

Name_____
Course_____
Date_____
Textbook_____
Chapter_____ Pages_____

I. SURVEY the chapter (take about 5 to 10 minutes). As you survey the chapter, answer the following questions.

A. What is the title of the chapter?_____

1. What do you know about this title?_____

_____

B. Is there a chapter summary at the beginning or end of the chapter?_____ On what page(s) is this summary located?_____ Be sure to read any summary information.

C. What are the lesson titles in this chapter? Please list them below:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

C-1. What are the main subtitles in the chapter? Please list them below:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____

C-2. What are the subordinate subtitles? List them below:

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1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

D. Please describe one or two illustrations, graphs, charts, pictures, tables,or cartoons that you became very interested in as you surveyed the chapter.

_____
_____
_____
_____
_____

E. Are there study questions listed at the end of the chapter?_____ If so, be sure read them.

F. Are there key vocabulary words listed at the beginning or end of the chapter? ____ If so, be sure to read and define them in the context of the lesson.

G. Can you predict in one or two brief sentences what this chapter will be about?

_____
_____
_____

After reading the lessons, *revise*, or *confirm* your prediction of what you thought this chapter would be about?_____

_____
_____

II. **QUESTION-** Ask yourself questions about the chapter by turning the titles and subtitles you listed in part 1-C into questions. Use who, what, where, when, why, and how when writing the questions.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

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III. **READ** one major subtitle area of the chapter at a time and answer the questions you asked for each subtitle in section II. (**Use QAR strategy to answer questions**)

A. Answer question 1 from section II, using one or two sentences.

_____

_____

_____

B. Answer question 2 from section II, using one or two sentences.

_____

_____

_____

C. Answer question 3 from section II, using one or two sentences.

_____

_____

_____

On a sheet of notebook paper, answer the rest of your subtitle questions.

IV. **RECITE** the answer(s) and question(s) your asked for each subtitle in section II. Recite the answers **ALOUD!!!! Do this each day for 20 minutes**

V. **REVIEW** the entire chapter by going back through the chapter and outlining the the questions as the main ideas and the answers as the supporting details. Use the outline format that is attached.

Remember to edit your questions and answers as we read and discuss each lesson in the chapter!.

VI. **REFLECT** think about what you have **learned** in this chapter. Write a brief summary.

Generic Appendix and Bibliography

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